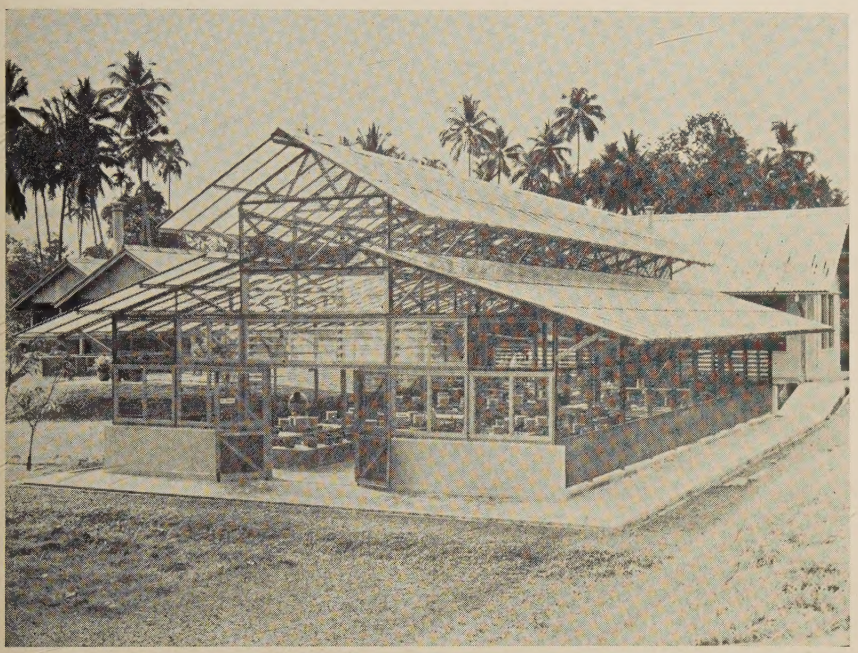
PLANTERS' BULLETIN

OF THE RUBBER RESEARCH INSTITUTE OF MALAYA



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1955

R R I

LOCATION. The institute's laboratories and offices are at the third mile, Ampang Road, Kuala Lumpur.

CORRESPONDENCE. All LETTERS must be addressed to the Director, Rubber Research Institute of Malaya, Post Office Box 150, Kuala Lumpur. Special inquiries may be marked for the attention of particular officers. The address for TELEGRAMS is Searching, Kuala Lumpur. TELEPHONE: Kuala Lumpur 3351. PARCELS occasionally arrive without any indication of their origin. Senders' names and addresses should be written clearly on the outside of all packages, and the institute should be advised of despatch by letter or telegram.

PROHIBITED PLANT SPECIMENS. Attention of planters and others in territories outside the Federation of Malaya and the Colony of Singapore is drawn to the Malayan Plant Importation Rules which prohibit the importation into Malaya of any part of a plant, whether living or dead, unless it is accompanied by a permit issued by the Director of Agriculture, Federation of Malaya. No permit will be issued in respect of any diseased plant or any plant pest. Any plant imported in contravention of these Rules (whose object is to prevent the introduction of diseases or pests) will be destroyed without examination. Anyone outside Malaya who desires our advice on any matter that may require examination of living material must first inquire by letter.

ADVICE. Inquiries are invited from rubber producers in the Federation of Malaya, the Colonies of Singapore and North Borneo, and the territories of Sarawak, Brunei and Nigeria, who may require more detailed information applicable to their own special problems. INTERVIEWS should be arranged by letter or telephone, as members of the senior research and advisory staff are frequently absent on visits to plantations. The institute is open from 8 am to 1 pm and 2 pm to 4 pm on Mondays to Fridays, and from 8 am to 12.30 pm on Saturdays.

EXPERIMENT STATION AND FACTORY. This station of the R R I is situated 16 miles from Kuala Lumpur, at Sungei Buloh on the Kuala Lumpur — Kepong — Kuala Selangor road. Visits may be made on Mondays or Wednesdays by arrangement. There is a guest house.

PUBLICATIONS. A list of 'Publications of the R.R.I.' is available on request. Subscription may be made by depositing $15 with us. An annual statement of account will then be submitted.

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OF THE RUBBER RESEARCH INSTITUTE OF MALAYA

Kuala Lumpur May 1955 Number 18

Editorial: Midstream Change

The American way of life is in many ways vastly different from that in Europe and the headlining of newspaper items in America often produces a sequence of words which an English reader fails to understand. Our heading derives from the proverb which advises never to change horses in midstream, and the caution implied has without doubt arisen in many minds when contemplating the unprecedented business transaction which has recently been negotiated in America. Arrangements have been made for the sale lock stock and barrel of a going concern, which has an annual output of 770,000 tons of material valued at more than US$420 million, at a price of US$310 million.

We refer to the operations of the Rubber Producing Facilities Disposal Commission which throughout 1954 was engaged in preparing for Congress recommendations for the sale of government owned co-polymer, butadiene and other synthetic rubber producing plant. The magnitude of the transaction might be compared on the basis of values and quantity of rubber produced with a change of ownership—to be achieved in one operation—of all the rubber producing areas in Malaya. Starting work in November 1953 the small three man commission first advertised its wares, and then within the short period of six months found time to visit each of the 27 government owned rubber producing facilities and receive, for 24 of the plants, 56 proposals and 19 alternate proposals from 35 prospective buyers. The succeeding six months were devoted to negotiations with the bidders, and the commission's recommendations to Congress were published in a report in January 1955.

Conditions of sale must (1) be in accordance with national security requirements, (2) establish a free competitive industry, and (3) produce full fair value for the facilities. In satisfaction of these conditions Congress was given 60 days to speak or hold its peace. Unless such an objection is raised and sustained while this copy of *Planters' Bulletin* is with the printer, approval is assured and the sale goes through.*

To secure the first condition, the sale agreements require the plants to be maintained and ready for prompt production for a period of ten years. Free competition is ensured by leaving no one company dominating production and by guaranteeing to small businesses a specified portion of the synthetic rubber produced. As evidence that a full fair value has been obtained for the facilities the contract sale prices

* *The plants have since passed into private hands as planned. The Senate rejected a veto of the sale by vote.*

of the plant represent 96.6% of the total unrecovered original investment.

The secrecy which necessarily cloaked the work of the commission until the report was published inevitably produced much speculation regarding various aspects of the future of synthetic rubber: would the industry take over the rubber producing facilities, what would be the price trend and production rate, and so on. One speculation which received much attention in American rubber circles concerned the future research work to be undertaken on synthetic rubber and how it would compare with investigations carried out when the plants were government owned, what would be the future balance between pioneering research and applied research, who would pay for it.

The members of the commission hold the view that research is an essential part of the programme for development of a synthetic rubber industry and that there is much remaining to be completed in the programme.

The R.P.F.D.C. report states its recommendation for the lines upon which government sponsored synthetic rubber research and development should proceed at least for the next two fiscal years. These indicate clearly that testing and evaluating the various formulas and types of rubbers for use in tyre manufacture should be left entirely to tyre companies, and that industry is expected to finance the development of small scale pilot plants attached to the various government owned facilities. Continued government support for basic research and the programmes contracted to universities and research institutions is recommended, and also the separate operation of the government testing laboratory at Akron University. Funds to continue these projects substantially as at present are requested for at least a trial period running through the fiscal year 1956.

For the long term future of government sponsored research on rubber the commission feels that the continuing programme should be placed in the hands of the National Science Foundation, which would appoint a small group of competent persons with whom would rest complete responsibility not only for the operation of the programme but for the determination of its scope, size and general direction. The group, eleven in number, includes six eminent scientists not otherwise connected with government, who would be competent to evaluate the research programme objectively and determine how it should be expanded, contracted or eliminated.

It would appear therefore that the United States Government, whilst being prepared to leave the technical development of research results to the industry, will ensure that a programme of basic research is maintained. The foundation for this decision is the need to undertake fundamental research which industry is unlikely to finance owing to the lack of early pecuniary gain that can be expected from it. The industry itself will certainly undertake some pioneering research, but will be mainly interested in financing applied research where adequate returns on the endproduct can be anticipated.

A number of the prospective buyers of the synthetic rubber facilities are oil and chemical companies, whose reputation for research is as high as in any industry; with these resources American rubber industry will have an imposing array of strength in the research field.

Private ownership of the plants and sponsorship of research will place limitations on the free exchange between all research workers of views and information, which existed under government ownership. Any slowing down which this may entail is more than likely to be outbalanced by the accelerated progress which usually stems from competition and the promise of benefits from patent rights.

The picture we have drawn shows that, unless Congress objects, the enormous task of negotiating the sale of government owned synthetic rubber factories is successfully accomplished. No interruption of the flow of products from the factories need be anticipated, and national security requirements, as well as those of small business, have been safeguarded.

The synthetic rubber industry was founded on the work of the research chemist, and in its future development provision for research has been adequately secured. We expect no diminution but a stimulation of both fundamental and applied research with the production of new elastomers to widen the range of uses for which synthetic rubber can be satisfactorily applied to replace natural rubber. The broad objective of the research programmes is to make the United States 'independent of natural rubber, most of which is produced in the Eastern Hemisphere.' How such a challenge is to be met is for all concerned with the natural rubber producing industry to decide.

Dry Rubber Content

Recently we have received a number of enquiries from planters who fear that they are getting abnormally low d.r.c. readings. Factors affecting the trend of d.r.c. are well known, but adequate details are lacking for Malaya. Our Botanical Division have records for various planting material at different ages at the Experiment Station, Sungei Buloh, also some data from estates, but a more complete review was lost during the Japanese occupation.

We appeal to planters for data on as wide a selection as possible, of clones or clonal seedling families of different ages, preferably from the dates of opening panels.

The dry rubber content of latex is comparatively high on first opening the tapping cut, and then falls until it reaches an equilibrium. Thereafter d.r.c. rises slowly with increase in age of the tree.

After prolonged rain or flooding, d.r.c. usually drops.

Another reason for exceptionally low d.r.c. readings is that the hydrometer type instruments—such as the Metrolac—are calibrated for a medium range. They therefore underestimate the value for latex with a low dry rubber content. (See *Planters' Bulletin 13,* page 74). Thus the d.r.c. of latex from young trees when first brought into tapping will settle down to a low value, which may appear yet lower because of the method of determination.

Information from individual estates will be treated as confidential, but will be used to compile tables. A form is enclosed with this issue. Please send in records, not only of abnormal but of normal values also. This will be much appreciated by us, and will provide a guide for all.

Planting Recommendations, 1955-6

GENERAL RECOMMENDATIONS on the choice of planting material must necessarily vary but little from year to year, the points of difference being clones which may be discarded for undesirable secondary characters which have appeared relatively late in life (e.g. burring of the main stem in clone RRIM 527) and clones which are included as more information becomes available regarding their local performance.

A departure from our previous recommendation is the inclusion of an intermediate class of material recommended for moderate scale planting. This class includes promising clones and seedling families which have passed the experimental stage but which have not been tested under different soil conditions over a sufficiently long period to have acquired the necessary degree of proof to justify a recommendation for large scale planting. The same category includes recently imported clones which are recommended for use on a commercial scale in their country of origin as, for example, the Java clones LCB 1320 and GT 1.

Proof of performance is the main criterion for a recommendation for large scale planting and no distinction is made between clones and seedling families provided they have acquired the necessary degree of proof in experimental or commercial plantings under a range of conditions. Other considerations beside yield which influence the choice of clones are vigour of growth, resistance to storm damage and to certain diseases, colour and properties of the latex, shape and density of crown with especial reference to early or late shading of the ground and to growth in closely planted rows.

No clone is best under all conditions and for all purposes. Advice on the choice of clones must therefore be governed by such considerations as soil type, topography and suitability of the latex for the manufacture of pale crepe or for concentration.

A clone no longer recommended for large scale planting may under certain conditions find favour as, for example, clone Sabrang 24 for coastal estates; or a clone on the recommended list may be discarded under conditions where its defects are seriously exaggerated. Thus clone Tjir 1 normally does well on the poorer soils but is not suitable for high elevations exposed to strong winds because of its susceptibility to wind breakage, nor for high water table soils because of its heavy crown. Clones PR 107 and Gl 1 which are wind resistant are not suitable for latex concentration because of the low mechanical stability of their latex, while clone RRIM 501 should not be planted under conditions which favour pink disease, to which it is partcularly susceptible.

Clonal seedlings, owing to the greater variation between the individual members of a population, are normally suitable for most conditions and purposes, although buddings of one clone may conform better with a given set of conditions. Seedling families even of clones known to be good seed parents require to be tested under a range of conditions before they are proved or, as more correctly described, approved for planting on a commercial scale.

Our recommendation of planting material may be broadly classified as follows.

Class I — For planting on a large scale, up to eighty per cent of area.

Clones PB 86, Tjir 1, PR 107 (= LCB 510), RRIM 501, RRIM 513 (only on the best soils) and, with reservations, Gl 1.

Clonal seedlings: Prang Besar Isolation Garden Seed from plots C, D and E; Tjir 1 seed either from monoclone plantings or from mixed plantings with other good parent clones.

Class II — For planting on a moderate scale, up to twenty per cent of the area in the aggregate.

Clones LCB 1320, GT 1, RRIM 526; and Prang Besar Further Proof 5/51, 5/63.

Clonal seedlings: Chemara Isolation Garden Seed B and E; Prang Besar Isolation Garden Seed F, G and H; Prang Besar seed from 'Preliminary Proof' and 'Further Proof' areas; and seed collected along the boundaries of commercial plantings of clones known to be good seed parents e.g. Tjir 1, AVROS 157, BR 2, Pil B84, RRIM 501, PR 107, LCB 1320.

Class III — For planting on an experimental scale, in observation plots of a few acres or of one tapping task.

Clones RRIM '600' series (RRIM 600 to 630); the more promising of the Prang Besar Preliminary Proof, e.g. S 78, 12/127, T157, T207, T495, 9/82, 24/51, 23/27, 28/83, 32/36; the Chemara 2nd series Nos. 26, 30, 31 and 32; Wardieburn A9; OY 1 and IRCI 7 from Indochina and NAB 12, 15 and 20 from Ceylon.

Clonal Seedlings: illegitimate seedlings of high yielding clones of which little is known of their value as seed parents.

The extent to which this broad classification is followed is largely determined by local experience, which may sometimes justify the use of a clone or seedling family on a larger scale than is generally recommended. Estates are advised to plant small areas of promising new clones so that performance may be studied under local conditions.

Stocks for Budding — Vigorous seedlings may be grown as stocks from mixed seed collected from budded areas. These are preferred to unselected seedlings, for this purpose.

CLONES RECOMMENDED FOR LARGE SCALE PLANTING

PB 86 — A clone of moderate vigour with a rather open, wind resistant crown. Despite slow growth in the early years and a yellowish foliage it is still considered to be one of the best all round Malayan clones. It yields more than clone Tjir 1 and has a white latex of high mechanical stability which is eminently suitable for the manufacture of pale crepe and for concentration. The bark characters are good. Recommended for large scale planting in Ceylon and Indochina.

Tjir 1 — A vigorous high yielding clone which does well on the less fertile soils. The weak junction of the branches with the main stem especially that of the first branch which may be corrected by

early pruning treatment and its dense heavy crown make it liable to wind breakage when planted in exposed situations and to windfalls on high water table soils. The colour of the latex varies according to site but is usually yellow, which makes it unsuitable for manufacture of pale crepe without special treatment; the latex concentrate is stable. The bark characters are good and Tjir 1 is an excellent seed parent. Recommended for large scale planting in Ceylon, Indonesia and Indochina.

RRIM 501 — A clone of the highest yielding class which is outstandingly vigorous on coastal soils and on good inland soils. It is not susceptible to wind breakage or to brown bast but is notably susceptible to pink disease. It produces a pale yellow soft crepe and a soft rubber. The latex concentrate has a low mechanical stability at first which increases to a high value during the second and third months of storage. Virgin bark and first renewal bark are of average thickness. The available evidence shows it to be a good seed parent.

RRIM 513 — A clone of the highest yielding class but of below average vigour; its use should be restricted to the best soils. It has a heavy crown and may lean on poorly drained coastal soils. It is resistant to wind breakage and to brown bast. Virgin bark and first renewal bark are somewhat below average thickness. The latex is white and mechanically stable and is very suitable for pale crepe manufacture and for concentration.

PR 107 — A vigorous high yielding clone with excellent secondary characters.

The stem is straight and remains erect; the crown is well balanced and wind resistant. The latex is white and generally has a high dry rubber content. It produces an average pale crepe but has a low mechanical stability and is stated to be unsuitable for concentration by centrifuging. The clone is recommended for large scale planting in Indonesia and Indochina.

Glenshiel 1 — A clone of moderate vigour with an open, well balanced crown and dark green foliage. It is wind resistant and does well on the coastal soils and the better inland soils. It is clearly unsuited to 100 per cent intensity tapping systems, particularly the full spiral fourth daily system, but is capable of excellent yields on the half circumference third daily system. The latex is mechanically unstable and unsuitable for concentration.

CLONES RECOMMENDED FOR MODERATE SCALE PLANTING

LCB 1320 — The highest yielder of all LCB clones. A vigorous clone with thick bark and reputed to have white latex suitable for pale crepe manufacture.

Branching is late and usually develops a lopsided crown susceptible to wind damage, unless corrective pruning is undertaken to promote branching when the trees are 12 to 15 feet tall. The clone is not in tapping in Malaya.

GT 1 — A vigorous clone with straight stem and compact crown of dark green leaves. Reputed to yield excellently in Indonesia where it is recommended for use on a large scale. It has thick virgin bark and good renewal. The clone is not in tapping in Malaya.

RRIM 526 — A vigorous high yielding clone with an attractive habit and good virgin bark and bark renewal. The latex is slightly yellow and only reasonably suitable for concentration.

PB 5/51 — An attractive clone, with a medium to heavy crown and excellent branching habit. The latex is suitable for concentration; it is deep yellow in colour and probably unsuitable for making pale crepe.

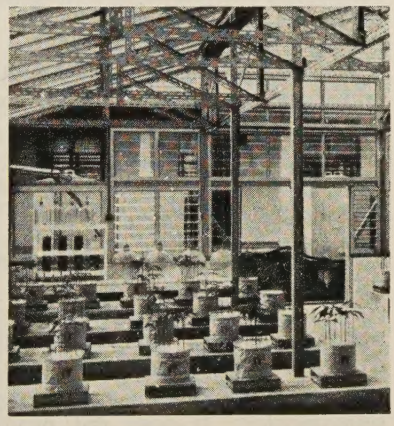
PB 5/63 — A clone of average vigour with a straight erect stem and a compact crown. The latex has not been tested for mechanical stability.

These last two Prang Besar clones have not been tested extensively in large scale trials.

Nutrition of Hevea

Communications 291 and 292 of the *Journal of the R.R.I. of Malaya* continued the series on the 'Nutrition of *Hevea Brasiliensis*'. In part III, on the interrelationships of magnesium, potassium and phosphorus, Dr E.W. Bolle-Jones demonstrates how this relationship affects the growth and composition of young Tjir 1 seedlings. A practical implication of this study is that heavy applications of phosphate where plants display magnesium deficient foliage may accentuate the severity of the deficiency. In part IV, Dr E.W. Bolle-Jones and Mr K. Ratnasingam examine clonal and seasonal variations in leaves of Tjir 1, PB 86, and RRIM 501, in the field. The two parts, III and IV, were published together.

To extend these nutritional investigations and to be able to study the effect of various micronutrient or 'trace element' deficiencies on the growth of hevea, a new glasshouse has been erected. This glasshouse, built to an original design, is an open sided structure supported by slotted aluminium alloy angle girders. To our knowledge it is the first glasshouse of its kind in the far east, where a compromise between the effect of overheating on growth and the protection of plants from contamination is necessary. As a result of experiments carried out in this glasshouse, information should become available on the relative requirements of hevea for copper, zinc and molybdenum and whether these nutrients may directly influence the concentration of rubber in the tissues.



Pink Disease

PINK DISEASE CAUSED CONSIDERABLE CONCERN in the early days of the planting industry, being made the subject of several special investigations about 1913. Subsequently it attracted much less attention, but with the already large and increasing acreage of post-war new plantings and replantings it is once more becoming serious. Essentially it is a disease of young rubber trees, from about 3 to 8 years old. Younger plants are not attacked and older trees are not sufficiently severely affected to need attention. The economic importance lies in the extensive destruction of branches and hence loss of canopy of trees not yet in tapping. It is found all over the country but is noticeably worse in wet localities.

A large number of plants in addition to rubber are attacked. Several cultivated fruit trees, cacao, coffee, tea, ramie and certain bushy legume covers are susceptible to pink disease, and there are other sources of infection in the jungle.

Symptoms — During the most vigorous phase of infection, before the attacked branch dies, a fine silky white cobweb creeps over the surface of the bark. The salmon pink fungal incrustation from which the disease derives its name arises later, and is the most easily recognisable stage. It is often confined to the lower surface of the infected branch; its surface is smooth yet broken up by small cracks. Sometimes the pink crust is not continuous but appears as tiny pustules that protrude through cracks in the bark in roughly parallel lines. In the earliest stage of the disease there may be a few drops of exuded latex which on closer inspection are seen to be associated with the white mycelial threads. Latex bleeding continues above while open wounds are formed in the infected region until the branch is ringed and dies. The streaks of blackened latex draw attention to advanced cases, particularly when associated with death of the foliage above the point of injury and with young shoots sprouting from dormant buds immediately below this point. Branches of any size may be ringed—even the main stem. As the attack usually occurs at a fork several branches may be involved. If the main fork is attacked the whole canopy can be lost, a large number of dormant buds shooting vigorously below as shown in the illustration. Dying branches often respond by premature flowering and fruiting, a phenomenon also known to be induced by root disease in its later stages. During dry weather the fungus stops growing and the incrustation becomes bleached. Detection of the parasite is then more difficult though the disease can usually still be recognised by its subsidiary symptoms.

Life History — The cause of pink disease is the fungus *Corticium salmonicolor*. It does not produce its spores within a fructification like the bracket of *Fomes* or *Ganoderma*, but from the surface of the pink crust. Another type of spore (the *Necator* stage) is formed in orange red pustules produced on the upper surface of side branches that have been killed by the fungus. The white cobweb is the vegetative phase comparable with the rhizomorph of a root disease fungus. Like the rhizomorph it becomes thicker and more deeply pigmented with age. Both spores and fragments of infected bark are carried by air currents and so spread the disease, which is active only during wet weather. It is then that the fungus is sporulating freely and the surface

of the bark moist enough for the spores to germinate and the mycelium to grow.

Not only does the rubber tree vary in its response to infection according to age and degree of maturity of the bark, but different clones show different degrees of susceptibility. Clone RRIM 501 is particularly susceptible, as is RRIM 618 which, with 619 and 620, is derived from it. The other parents of these three clones are Lun N, Tjir 1 and RRIM 511 respectively. That Lun N is a parent of both 501 and 618 shows that this is the clone which transmits marked susceptibility to pink disease.

Control — Applying fungicides to trees infected with pink disease can be laborious and sometimes it is possible to improve upon customary procedures.

Unnecessary movements within an infected area should be avoided in order to reduce the chance of distributing infective material. Treatment, therefore, should where practicable take place from the ground by spraying. With large trees this is obviously impossible. Infected trees have to be climbed, and in this situation painting is probably the simplest method, although a small pneumatic hand sprayer might be used. In immature areas, however, it is usually possible to treat adequately all but the tallest trees by means of knapsack sprayers equipped with extension lances. the whole unit being handled from the ground by one man. An alternative is to use a stirrup pump connected to a length of rubber hose attached to a long bamboo pole. The hose should be fitted with a nozzle giving a spray discharge, not a jet. One labourer will be required to pump and another to handle the lance. A trigger cut-off valve in the feed line is a refinement, to reduce dripping when the sprayer is not in action.

Bordeaux mixture, Fylomac 90 and the water miscible tar acid fungicides used against mouldy rot are all effective. Asphalt and kerosene mixture, previously recommended, has been found to be less satisfactory and is now dropped. Bordeaux cannot be used on trees in tapping as it contains copper which has a deleterious effect on rubber manufactured from latex contaminated with it; for immature trees it is an excellent fungicide, and cheap. Fylomac 90 and the tar acids can be used on trees irrespective of age, but when spraying these materials care should be taken not to wet the foliage because of the danger of scorching the

leaves. Defoliation should not occur unless spraying is carelessly carried out; it is in any event only a temporary effect.

Bordeaux mixture can be prepared as described on page 55, or a preparation can be bought ready for mixing if the cost is not so important. Fylomac 90, supplied by Imperial Chemical Industries (Malaya) Ltd, should be used at a concentration of 0.5% (8 ounces in 10 gallons). Water miscible tar acid fungicides should be used at the higher of the two concentrations recommended on page 58 of *Planters' Bulletin 6*.

The aim in treating pink disease is first to prevent extension of the disease and second to arrest its course before infected branches become deeply penetrated and killed. The two objects are related and success in both depends upon the early recognition of the disease. Fungicidal applications control the disease and so prevent the production of infective material, provided that rounds of treatment are carried out often enough. New infections do not necessarily indicate failure of the treatment as there may be infective sources outside the area; only prophylactic treatment can guard against this. Timely applications of a fungicide will halt the fungus but they cannot be expected to save dying branches. Applications are advised at intervals of three weeks during wet weather, and whenever outbreaks are recorded at other times. As a single application will not always effect control, previously treated trees should be re-examined at the next round.

Pruning of affected branches has in the past been advised; the operation accounted for a considerable part of the control costs and caused delay in treatment. Recent experiments indicate that pruning should be avoided at least while the disease is active. Branches which are dead or dying should be treated with fungicide but left in place. If subsequent inspections reveal that the infection is extending, pruning can be carried out but only during dry weather when the disease is inactive. The branch should first be given another coat of fungicide and afterwards be burnt.

Prophylactic treatment—spraying the main branches of every tree with fungicide—will reduce the number of new outbreaks whether originating from within the area or from some outside source. However. with the equipment normally available to an estate it is not considered economic as a normal routine, though a round of prophylactic spraying might with advantage be given at the commencement of the wet season in young areas which previously had suffered severely from the disease.

R. R. I. News

The 'Type Descriptions and Packing Specifications for Natural Rubber', adopted by the Rubber Manufacturers' Association of the United States and endorsed by the Rubber Trade Association of New York, has been revised and reprinted. As long as our small stock holds we can supply copies on request. This revision includes Amendment No. 1 of 1 September 1953.

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During last year a further trial of over 200 clones was established from our imported seedlings collection. The clones were prepared from seedlings of *Hevea brasiliensis* from Brazil and Peru, *Hevea benthamiana* from Brazil, and from a clone resistant to South American Leaf Blight.

Bird's Eye Spot

THE LEAF DISEASE KNOWN AS BIRD'S EYE SPOT is found in rubber nurseries throughout Malaya. It has been widespread since 1920. It rarely kills plants but weakens and defoliates them; the consequent slow development to the right size for transplanting or budding may upset planting programmes.

Symptoms — The typical spots from which the disease derives its name are circular, one to three millimetres in diameter, with a transparent centre and distinct narrow brown margin. These bird's eye spots result from infection at the most susceptible stage, when the leaves have reached their full size but are still hanging limply. Different symptoms appear if the infection occurs before or after this stage. Discrete lesions are not formed on younger leaves, but a spreading growth that blackens and shrivels them. On older leaves, where the cuticle has hardened at the time when the leaf rises to the horizontal position, the lesions remain small, appearing as dark brown specks. Quite often all three—shrivelling of the tip, typical bird's eyes, and brown specks—appear on the same leaflet.

The shrivelling and specking symptoms, but not the bird's eye spots, are similar to those of *Gloeosporium* leaf disease. The two can easily be confused, though a *Gloeosporium* spot on an old leaf is usually raised up on a small cone. *Gloeosporium,* moreover, is more likely to be encountered on buddings whereas bird's eye spot is essentially a disease of young seedlings, becoming progressively less severe as the trees age. It is of very rare occurrence on mature trees; in the few cases found it has been of no importance. A coloured illustration of each disease will be found in *Planters' Bulletin 5, page 38.*

Cause and Spread — The fungus *Helminthosporium heveae* is responsible for the disease. It produces large dark brown elongated spores about 1/250 of an inch long and just visible under a hand lens. During the period of heavy sporing they may be visible to the naked eye as a glistening chocolate brown mass occupying the clear central area of the lesions on the under surface of the leaf.

Spores are readily carried over many miles by wind. Rain, dew, blowing together of plants, and passage of labourers through the massed plants, all help to free the spores from the lesions. Once the disease has appeared in a nursery it spreads rapidly and scarcely a leaflet escapes infection.

Control — The disease has proved remarkably intractable to fungicides. This is probably due to the resistant nature of the spore and the rapidity with which it penetrates the leaf, coupled with the difficulty of applying fungicides effectively to the young leaf at its most susceptible stage, when the surface is waxy.

Extensive spraying and dusting trials against bird's eye spot have been carried out in nurseries on our Experiment Station at Sungei Buloh with a range of fungicides, sticking agents and applying machinery. The fungicides tested have included sulphur, copper containing compounds and some synthetic products. Sulphur was valueless. None of the treatments gave satisfactory control of the disease even when applied with power operated equipment; certain of them did have a beneficial effect but this was insignificant. This limited degree of success was obtained with the copper fungicides—Bordeaux mixture made

A bud shoot that has escaped infection contrasted with a heavily infected shoot from the stock on to which it is grafted.

as described on page 55, and the proprietary materials Perelan (a dust) and Perenox (a wettable powder). Using the usual hand operated machines—rotary duster or knapsack sprayer—much too little fungicide reaches the undersides of the leaves. Until problems of coverage and retention have been solved, fungicidal applications are not economic.

Complete control of the disease has been obtained experimentally over half an acre of nursery by erecting a heavy atap shade, seven feet high. No advantage was gained because the lower light intensity slowed up growth as much as the disease did on plants in the open. There may be an ideal density of shade which will effectively reduce disease intensity while still allowing rapid growth of the seedlings, but the method has as yet no place in estate practice.

It has been claimed that bird's eye spot is absent from well manured nurseries. Although this cannot be substantiated the disease doubtless does less damage where conditions are suitable for vigorous growth. It is more important to ensure good conditions by manuring and perhaps also by mulching the seedlings than to apply fungicides which have been shown to have little effect. Further, poor sandy or lateritic soils upon which the plants would suffer from drought during dry periods should be avoided when siting a nursery.

For a detailed account of the disease the reader is referred to our Journal Communication 280.

The main malarial season *is from May to June. In Planters' Bulletin 6 a note appeared, entitled 'Replanting and Malaria'. A revised edition of Malaria Control by Modern Methods is obtainable from the Secretary, Malaria Advisory Board, Institute for Medical Research, Kuala Lumpur. The price is 50 cents.*

Bordeaux Mixture

Bordeaux fungicides are prepared by mixing together a solution of copper sulphate and a suspension of lime. The composition, which is varied according to the crop to be treated and the disease to be controlled, is customarily expressed by three numbers—the weight of copper sulphate in pounds, the weight of quicklime in pounds and the volume of water in gallons. The directions below are for a 4:5:40 formula.

Precautions — The best results with Bordeaux mixture are obtained only if care is taken in its preparation. The following notes are important.

1. The copper sulphate must be completely in solution before the lime is added. It should be dissolved in a wooden, earthenware or copper container, as iron and galvanised iron rapidly decompose the mixture.

2. The lime used must not have deteriorated, as it rapidly does on exposure to the air. Good condition is best assured by using freshly burnt quicklime. If slaked lime is used, the weight taken must be one and a half times the weight of quicklime.

3. The liquid should be stirred well while mixing proceeds, and it is desirable to agitate the mixture during spraying.

4. The mixture should be made immediately prior to use.

Directions—Dissolve 4 pounds of copper sulphate in 36 gallons of water. If the crystals are large, they may be tied loosely in a bag suspended just below the water surface and left overnight. They will dissolve more quickly in hot water. If the chemical is in powdered form, it will dissolve easily if washed through a sieve into the container.

Slake 5 pounds of quicklime in a kerosene tin, and add successive small quantities of water until it crumbles to powder. Add more water to make a milky suspension, and finally make up to 4 gallons.

Slowly pour the lime suspension through a fine mesh sieve into the copper sulphate solution, stirring all the while with a wooden paddle.

Stock solution—Stock solutions containing one pound in one gallon can be prepared for both ingredients, but they should not be kept too long and must be well covered. For use, appropriate quantities should be diluted and the above mixing procedure followed.

R. R. I. News

The R.R.I. Experiment Station has acquired a further 800 acres of jungle and lalang land from the Sungei Buloh Forest Reserve.

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Mr W. G. Wren, Head of the Chemical Division, and Mr. J. E. Morris are attending the Conference on Quality and Packing of Rubber in New York this month, as technical advisers to the Malayan delegation.

o

Estimated total expenditure of the R. R. I. last year was $3,650,000 including $750,000 on the Experiment Station at Sungei Buloh. Against this, an estimated $733,000 was recovered from sales of rubber and planting material.

Recent experiments have shown that storage at temperatures not greatly in excess of the Malayan ambient is likely to be deleterious to latex concentrate. Special care should therefore be taken in transit.

o

Extended examination of the latex from trees treated with 2, 4, 5 - T yield stimulant has shown no harmful effect. Various types of rubber prepared from the latex have also been found to be unaffected.

o

Phosphate manuring experiments in replanted areas show that soluble superphosphate has no advantage over insoluble rock phosphate for manuring young rubber.

o

Postwar immature experimental plantings of RRIM '500' and '600' series clones on estates throughout Malaya now total over 600 acres. Some 1,300 acres of prewar experimental plantings are in recording.

o

Heveaplus M, the new modified rubber recently produced by our colleagues the British Rubber Producers' Research Association, can be prepared simply in Malaya from fresh latex. A substance called methylmethacrylate—the basis of Perspex—is grafted on to the natural rubber molecule to form side chains. Development for industrial application is being carried out in England.

o

A series of new families of legitimate seedlings was obtained from 6,500 hand pollinations, representing twelve different crosses, made during the short main flowering season last year.

Correspondence

The Editor invites the offer of brief letters for publication. Comment and queries arising from articles in PLANTERS' BULLETIN *are welcome. The name and address of the writer must be given in full, but may be withheld from publication.*

o

DAMAGE BY BATS

Numbers of flying foxes have been alighting at night on the trees in our 1947 replant of clone Gl 1 and eating the leaves. Some trees have only a few tattered remnants of leaves remaining. There are two unusual features. First, the bats chew the leaves and then spit out the residue. Second, adjoining fields with better foliage are unaffected. Perhaps the bats are too populous for their normal food supplies and are attracted by some substance associated with the dark colour of Gl 1 leaves.

Rubber Estates of Malaya Ltd

S. Sandison

General Manager

We are at a loss to know why flying foxes should prefer Gl 1. Two instances of similar damage have been reported lately from Johore, but without indication of the clones attacked. We shall be interested to learn of further depradations, particularly from eye-witnesses. — Editor

2, 4, 5 - T

Everyone knows of the use of 2, 4, 5 - T as a yield stimulant. It has more recently come into use as a tree poison. Can you explain briefly why in one case it will stimulate, and in another case it will kill?

Bukit Cloh Estate
E. Clyne
Manager

It is a matter of degree of application. For poisoning, the mixture is stronger and more extensively applied.

As a yield stimulant the normal butyl ester of 2, 4, 5-T is used as a 1% acid equivalent solution in palm oil, thickened by adding an inert grease such as Standard Vacuum Product 2295C or Shell Otina Compound C. This is applied to a three inch strip of lightly scraped bark below the tapping cut. Bark damage is minimised by applying the stimulant thinly and evenly to the narrow strip. The inert grease reduces the penetration of the oil carrier.

For a tree poison the same chemical is used as a 5% acid equivalent solution in a gas oil. Application is described in a note on page 41 of Planters' Bulletin 17, which was in press but not published when Mr. E. Clyne's letter arrived. Nevertheless we are pleased to have this opportunity of comparing the two techniques, since there appears to have been some confusion.—Editor.

o

RUBBER AND TEA

With reference to the article 'Cultivating Other Crops with Rubber' in *Planters' Bulletin 16*, I feel that the paragraph on tea may mislead.

In Ceylon, the commercial planting of rubber began mostly with the interplanting of rubber trees in fields already planted with tea, and rubber trees were also planted along road and path edges. The masses of feeding rubber roots soon had a disastrous effect on the tea and planters were left with the choice of cutting out either the tea or the rubber; the two crops obviously would not grow together satisfactorily.

Where rubber had been closely planted the tea was removed, otherwise the rubber was sometimes taken out. Any tea field adjacent to a rubber field needed a deep isolation drain to prevent the rubber roots from invading and impoverishing the first few rows of tea. I well remember a field of young tea from which rubber had been removed some fifteen years previously; it still showed six or eight very poor tea rows adjacent to the original rubber rows, in spite of extra manuring and careful pruning and plucking.

With the high cost of planting tea and the danger of excessive root and shade interference from the rubber trees, I consider that tea should not be recommended as a commercial proposition for interplanting with rubber.

Wardieburn Estate
H. B. Bruce
Manager

The author replies:

Your correspondent Mr H. B. Bruce has had firsthand experience of interplanting tea and rubber and his opinion will be of great value to planters who might consider cultivating these two crops together. This emphasises the importance of considering intercultivation systems

as experimental until they have been tested on the ground. Stress was laid on this point in the first paragraph of the Discussion section of my article.

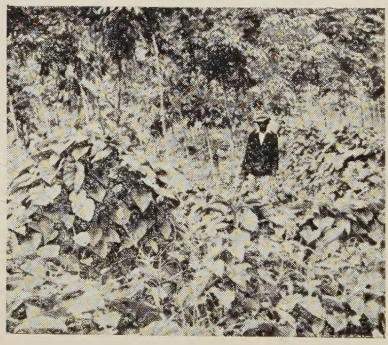
I gave another reason for considering tea to be an unsuitable crop to interplant with rubber and it is, I think, quite clear from the text that I do not necessarily recommend the intercultivation with rubber of all the crops discussed.

The competition of rubber roots appears to vary greatly with soil type. Thus cacao seems to suffer no ill effects from close proximity to young rubber on the lateritic Malacca soil series, whereas it is sensitive to competition on most other soils.

Department of Agriculture
E. F. Allen
Senior Agronomist

o

COVER COMPETITION

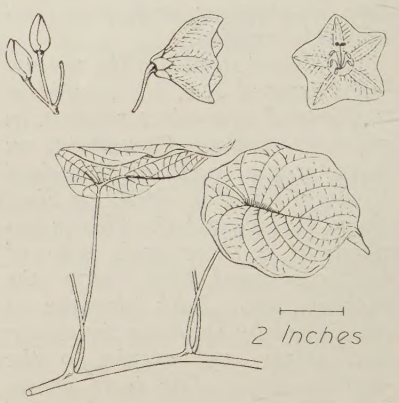


The natural covers which you have identified for me as *Merremia nymphaeifolia* (synonym, *Ipomea peltata*) and *Merremia umbellata* have greatly helped to eliminate lalang in new clearings here, in North Borneo. These creepers climb over everything, and even kill big trees. Lalang, elephant grass (*Sorghum propinquum*), and stumps, all disappear leaving a beautiful ground cover. Young rubber nearby shows no bad effects.

Where legumes such as *Pueraria* and *Centrosema* are established these climb over and suppress the *Merremia* creepers, which decompose.

The photograph shows *Merremia* in full control.

Sandac Rubber Estates Ltd
Tabanac Estate, Lahad Datu
British North Borneo
N.S. Peralta
Manager



The large climber, Merremia nymphaeifolia, has such possibilities for suppressing undesirable covers that it merits investigation as to soil preferences and effect, and susceptibility to pests and disease. It has been reported from immature rubber areas in Kelantan and Malacca, and we invite further observations.

This lactiferous creeper of the morning glory family (Convolvulaceae) is common on jungle margins, where it may entwine and cover trees up to 100 feet tall. The stem forms a large tuber underground. The purplish dark green leaves and young shoots are usually smooth and shiny, and the bell shaped flowers are white or yellow.

So vigorous a cover may prove costly to control.—Editor

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Courses for Senior Estate Conductors

No vacancies remain for the refresher courses announced in our last issue, nor can further applications be considered this year.

THE PHOTOGRAPH ON THE COVER IS OF THE NEW GLASSHOUSE FOR POT CULTURE DESCRIBED IN THIS ISSUE

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